DETAILED ACTION

Response to Arguments

1.   Applicant's arguments filed 04/08/2010 have been fully considered but they are not persuasive because the argued features, i.e., there is no indication in Foschini that the number of streams or elements is equal to the number of antennas, thus it is submitted that Foschini does not teach this feature of claim 9. The examiner respectfully disagrees because claim 9 does not claim the feature as argued, i.e., "number of streams or elements is equal to the number of antennas", instead, claim 9 claims "dividing data into a plurality of elements such that the number of elements corresponds to the number of subcarriers". These statements are clearly different. Therefore the argue features are invalid from a stand point of new matter.

        Secondly, the argued features on pages 5-6, i.e., Walton merely discloses that two elements are sent using the subbands and does not disclose that these two elements are sent on the same subcarrier because they could be sent on any of the subcarriers of such a subband."

        The examiner respectfully disagrees because Walton teaches and suggests a transmitter generates Space-Time Transmit Diversity STTD symbols, x1=[s1 s2], x2=[s2* s1*], x1 is transmitted from antenna1, x2 is transmitted by antenna2, and s1 and s2 are transmitted on a subband k, s2* and s1* are transmitted on subband (k+1) (see Walton, paragraphs [74]-[76]), therefore, Walton discloses the claimed feature, i.e., "different elements are assigned to one subcarrier" from claims 9, 13 and 20, where reference Foschini does not suggest of.

        As a result, the claimed features were written such that they read upon the cited references.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

        (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to

be patented and the prior art are such that the subject matter as a whole would have been

obvious at the time the invention was made to a person having ordinary skill in the art to which

said subject matter pertains. Patentability shall not be negatived by the manner in which the

invention was made.

3.   This application currently names joint inventors. In considering patentability of the claims

under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was

commonly owned at the time any inventions covered therein were made absent any evidence to the

contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and

invention dates of each claim that was not commonly owned at the time a later invention was made in

order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e),

(f) or (g) prior art under 35 U.S.C. 103(a).

4.   **Claims 9-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Foschini et al. (US

2002/0142723**) and further in view of **Walton et al. (US 2004/0081131).**

       As to claim 9, (Previously Presented) Foschini teaches a method of transmitting data by radio

(*see Foschini, the abstract*), comprising:

       using a plurality of subcarriers of a frequency band and a plurality of antennas for transmission

such that each antenna transmits data using the plurality of the subcarriers (*Foschini, pp [4], [31],

[56]-[57], [60], multiple antennas transmit data sub streams over different channels*);

       dividing data for transmission into a plurality of elements such that the number of data

elements corresponds to the number of subcarriers (*Foschini, pp [4], [31], [56]-[57], [60]*);

       for each antenna, assigning each element to a subcarrier for transmission, such that for at least

two antennas and at least one subcarrier, different elements are assigned (*Foschini, pp [92], data sub

streams are assigned and modulated into different frequency bands*), and

       before performing an OFDM modulation for each antenna, multiplying each element by an

antenna-specific and an element-specific factor (*Foschini, pp [79]-[80], [89], each data sub stream is

multiplied by a scaling factor*).

Foschini does not teach two antennas transmit different elements on one subcarrier. Walton

teaches two antennas transmits two elements on a subband (*see Walton, pp [76]*), therefore, it would

have been obvious to a person of ordinary skill in the art at the time of the invention was made to

modify teachings Foschini by combining teachings of Walton of transmitting OFDM symbols over a

subband so as to reserve a set of subbands in the OFDM environment as taught by Walton (*see Walton,

pp [5]-[11]*).

As to claim 13, (Previously Presented) Foschini teaches a method of transmitting data by radio

(*see Foschini, the abstract*), comprising:

using a plurality of subcarriers of a frequency band and a plurality of antennas for transmission

such that each antenna transmits data using the plurality of the subcarriers (*Foschini, pp [4], [31],

[56]-[57], [60], multiple antennas transmit data sub streams over different channels*);

dividing data for transmission into a plurality of data elements such that the number of data

elements corresponds to the number of subcarriers (*Foschini, pp [4], [31], [56]-[57], [60], multiple

antennas transmit data sub streams over different channels*);

for each antenna, assigning each element to a subcarrier for transmission, such that for at least

two antennas and at least one subcarrier, different elements are assigned (*Foschini, pp [92], data sub

streams are assigned and modulated into different frequency bands*);

performing an OFDM modulation for each antenna to produce timing sequences of time-

dependent signals (*Foschini, pp [79]-[80], [89]*); and

for at least one antenna, rearranging the order of the time-dependent signals after OFDM

modulation (*Foschini, pp [31], [60], [62], [81], data sub streams are re-arranged cyclically over all of

the transmit antennas*).

Foschini does not teach two antennas transmit different elements on one subcarrier. Walton

teaches two antennas transmits two elements on a subband (*see Walton, pp [76]*), therefore, it would

have been obvious to a person of ordinary skill in the art at the time of the invention was made to

modify teachings Foschini by combining teachings of Walton of transmitting OFDM symbols over a

subband so as to reserve a set of subbands in the OFDM environment as taught by Walton (*see Walton, pp [5]-[11]*).

As to claim 20, (Previously Presented) Foschini teaches a transmitter to transmit data by radio using a plurality of subcarriers of a frequency band and a plurality of antennas for transmission such that each antenna transmits data using the plurality of subcarriers (*see Foschini, the abstract*), comprising:

division means for dividing the data into a plurality of elements such that the number of elements corresponds with the number of subcarriers (*Foschini, pp [4], [31], [56]-[57], [60], multiple antennas transmit data sub streams over different channels*); and

an OFDM modulator to perform OFDM modulation for each antenna to produce time-dependent signals (*Foschini, pp [79]-[80], [89]*);

wherein the transmitter comprises either:

multiplication means for multiplying each element for each antenna by an antenna-specific and element-specific factor before OFDM modulation (OFDM) (*Foschini, pp [79]-[80], [89], each data sub stream is multiplied by a scaling factor*), or rearrangement means for rearranging the order of the time-dependent signals after OFDM modulation (*Foschini, pp [31], [60], [62], [81], data sub streams are re-arranged cyclically over all of the transmit antennas*).

Foschini does not teach two antennas transmit different elements on one subcarrier. Walton teaches two antennas transmits two elements on a subband (*see Walton, pp [76]*), therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention was made to modify teachings Foschini by combining teachings of Walton of transmitting OFDM symbols over a subband so as to reserve a set of subbands in the OFDM environment as taught by Walton (*see Walton, pp [5]-[11]*).

As to claim 10, (Previously Presented) Foschini, as modified by Walton, teaches a method in accordance with claim 9, wherein the factor is a complex or real number, the absolute value of the factor being 1 (*Walton, pp [75]-[76]*).

As to claims 11, 16, 18, (Previously Presented) Foschini, as modified by Walton, further

teaches a method in accordance with claims 9, 15, 13, wherein for at least two antennas a common

pattern is used to assign each element to a corresponding subcarrier (*Foschini, pp [31], [60], [62],*

[81]).

As to claims 12, 17, 19, (Previously Presented) Foschini, as modified by Walton, further

teaches a method in accordance with claims 11, 16, 18, wherein the common pattern is a cyclic

permutation (*Foschini, pp [31], [60], [62], [81]*).

As to claim 14, (Previously Presented) Foschini, as modified by Walton, further teaches a

method in accordance with claim 13, wherein for at least two antennas, the order is rearranged in

accordance with a rearrangement common pattern (*Foschini, pp [31], [60], [62], [81]*).

As to claim 15, (Previously Presented) Foschini, as modified by Walton, further teaches a

method in accordance with claim 14, wherein the rearrangement common pattern is a cyclic

permutation (*Foschini, pp [31], [60], [62], [81]*).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set

forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from

the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing

date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH

shortened statutory period, then the shortened statutory period will expire on the date the advisory

action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing

date of the advisory action. In no event, however, will the statutory period for reply expire later than

SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner

should be directed to HUY C. HO whose telephone number is (571)270-1108. The examiner can

normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor,

Patrick Edouard can be reached on 571-272-7603. The fax phone number for the organization where

this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application

Information Retrieval (PAIR) system. Status information for published applications may be obtained

from either Private PAIR or Public PAIR. Status information for unpublished applications is available

through Private PAIR only. For more information about the PAIR system, see http://pair-

direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the

Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO

Customer Service Representative or access to the automated information system, call 800-786-9199 (IN

USA OR CANADA) or 571-272-1000.

/Huy C Ho/

Examiner, Art Unit 2617

/Patrick N. Edouard/

Supervisory Patent Examiner, Art Unit 2617